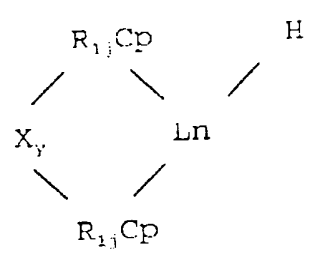


Amend

CLAIMS

1. A method of preparing block copolymers, comprising the steps of polymerizing a first monomer consisting of an alpha-olefin containing from 3 to 20 carbon atoms into a first, isotactic block, using a catalyst, then polymerizing at least one second monomer, said catalyst being in the form of a hydride complex of a trivalent metal from the rare earth group, having the formula I:



in which:

Cp is a cyclopentadienyl radical;
 R_{1j}, identical or different at each occurrence, is a substituent of the cyclopentadienyl group and is an alkyl radical or a silicon-containing hydrocarbon radical, unsubstituted and containing from 1 to 6 carbon atoms;
 j, identical or different at each occurrence, is 1, 2 or 3;
 X is a divalent alkylene radical containing from 1 to 20 carbon atoms or Si(R)₂ in which R is an alkyl radical having from 1 to 4 carbon atoms;
 y is 1 or 2;
 Ln is Y or Sm.

2. The method as claimed in claim 1, wherein, in the formula I, R_{1j}Cp is the group 2-Me₃Si, 4-Me₂tBuSiCp or the group 2-Me₃Si, 4-tBuCp.

3. The method as claimed in claim 1 or 2, wherein the catalyst is Me₂Si(2-Me₃Si, 4-Me₂tBuSiCp)₂YH or Me₂Si(2-Me₃Si, 4-tBuCp)₂SmH.

4. The method as claimed in one of claims 1 to 3, wherein the catalyst is racemic.
5. The method as claimed in one of claims 1 to 4, wherein the catalyst is generated in situ in the presence of at least one portion of the first monomer.
6. The method as claimed in one of claims 1 to 5, wherein the catalyst is prepared by hydrogenation of the alkyl precursor.
7. The method as claimed in one of claims 1 to 6, wherein the blocks are homopolymers or random copolymers.
8. The method as claimed in one of claims 1 to 7, wherein the block copolymer comprises a block of the second monomer which is a vinyl, vinylidene or lactone compound.
9. The method as claimed in claim 8, wherein the vinyl or vinylidene compound is represented by the formula $H_2C=CR'Z$ in which R' is hydrogen or an alkyl radical having from 1 to 12 carbon atoms and Z is an electron-withdrawing radical.
10. The method as claimed in claim 9, wherein the vinyl or vinylidene compound is an ester of an unsaturated carboxylic acid.
11. The method as claimed in one of claims 8 to 10, wherein the poly-alpha-olefin is crystalline.
12. The method as claimed in one of claims 1 to 11, wherein the second monomer is polar.
13. The method as claimed in one of claims 1 to 12, for preparing a poly-alpha-olefin/PMMA or poly-alpha-olefin/polylactone copolymer.
14. The method as claimed in one of claims 1 to 10, wherein the block copolymer comprises a block of the second monomer which is an alpha-olefin.
15. The method as claimed in claim 14, wherein the first poly-alpha-olefin is crystalline and the second poly-alpha-olefin is crystalline.
16. The method as claimed in claim 15, for preparing a PP/PE copolymer.

17. The method as claimed in claim 13, wherein the first poly-alpha-olefin is crystalline and the second poly-alpha-olefin is amorphous.
18. The method as claimed in claim 17, for
5 preparing a PP/EP copolymer.
19. The method as claimed in one of claims 1 to 18, wherein the block copolymer comprises a first iPP block.
20. A copolymer comprising a first block of a
10 crystalline polyolefin derived from an alpha-olefin containing from 3 to 20 carbon atoms and a second block of an amorphous polyolefin, with the exception of a PP/EP copolymer having a molecular mass M_n of less than or equal to 16 000 and a polydispersity index of
15 between 3 and 3.3.
21. The copolymer as claimed in claim 20, which is a PP/EP copolymer.
22. A copolymer comprising a first block of a crystalline polyolefin derived from an alpha-olefin
20 containing from 3 to 20 carbon atoms and a second block of a crystalline polyolefin.
23. The copolymer as claimed in one of claims 20 to 22, wherein the first block is isotactic.
24. A copolymer comprising a first block of an
25 amorphous polyolefin derived from an alpha-olefin containing from 3 to 20 carbon atoms and a second block of an amorphous polyolefin.
25. The copolymer as claimed in one of claims 20 to 24, wherein the blocks are homopolymers or random
30 copolymers.

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